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Mom Likes You Best: Do Homeschool Parents Discriminate against Their Daughters

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MOM LIKES YOU BEST: DO HOMESCHOOL PARENTS DISCRIMINATE AGAINST THEIR DAUGHTERS?

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Abstract

This study tests assertions by critics of homeschooling that parents who homeschool discriminate against their daughters and give preference to their sons in their educational pursuits. Specifically, the study asks three questions: (1) Is there a significant difference between male and female homeschooled students in educational indicators; (2) Is there a significant difference in comparative perceptions of male and female student performance in math between homeschool and non-homeschool parents and between parents of male students and parents of female students; (3) Is there a significant difference in comparative perceptions of male and female student performance in math between homeschooled and non-homeschooled students and between male and female ninth grade students? Results indicate no significant differences in educational indicators based on gender.

INTRODUCTION

Homeschooling is a practice in which the education of children is parent-controlled or parent-directed (and sometimes student-directed) instead of teacher-directed, and is implemented at home rather than in a traditional public or private school setting.[1] Consistent with other forms of school

1. *See generally* Kurt J. Bauman, *Home Schooling in the United States: Trends and Characteristics* (U.S. Census Bureau Population Div., Working Paper No. 53, 2001); Brian D. Ray, *Home Schooling: The Ameliorator of Negative Influences on Learning?*, 75 PEABODY J. EDUC. 71, 71–106 (2000).

choice,[2] homeschooling is an educational policy and practice that elicits strongly held views by advocates[3] and opponents[4] alike. Unlike other forms of choice, however, it has been the subject of comparably little empirical examination.[5] The paucity of research stems from a dearth of data,[6] itself a consequence of a population that is difficult to study due to its geographic diffusion and general skepticism of, or unwillingness to participate in, studies by unknown researchers.[7] The work that has been done tends to focus on three domains, the academic performance of homeschoolers versus public (and sometimes private) school students,[8] parents' reasons for homeschooling,[9] and legal issues surrounding homeschooling.[10] The first two of these domains will be reviewed below. The latter will largely be left to

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2. CLIVE R. BELFIELD & HENRY M. LEVIN, PRIVATIZING EDUCATIONAL CHOICE: CONSEQUENCES FOR PARENTS, SCHOOLS, AND PUBLIC POLICY 3-5 (2005); Robert G. Houston, Jr. & Eugenia F. Toma, *Home Schooling: An Alternative School Choice*, 69 S. ECON. J. 920, 920-935 (2003).

3. Michael P. Farris & Scott A. Woodruff, *The Future of Home Schooling*, 75 PEABODY J. EDUC. 233, 233-255 (2000).

4. Chris Lubienski, *A Critical View of Home Education*, 17 EVALUATION & RES. EDUC. 167, 167-178 (2003).

5. Michael F. Cogan, *Exploring Academic Outcomes of Homeschooled Students*, 208 J. C. ADMISSION 18, 18-25 (2010); Christa L. Green & Kathleen V. Hoover-Dempsey, *Why Do Parents Homeschool? A Systematic Examination of Parental Involvement*, 39 EDUC. & URB. SOC'Y 264, 264-285 (2007); Christa L. Ice & Kathleen V. Hoover-Dempsey, *Linking Parental Motivations for Involvement and Student Proximal Achievement Outcomes in Homeschooling and Public Schooling Settings*, 43 EDUC. & URB. SOC'Y 339, 339-369 (2011); Laura Mezzano Barwegen et al., *Academic Achievement of Homeschool and Public School Students and Student Perception of Parent Involvement*, 14 SCH. COMMUN. J. 39, 39-58 (2004).

6. Eric J. Isenberg, *What Have We Learned About Homeschooling?*, 82 PEABODY J. EDUC. 387, 387-409 (2007).

7. Ed Collom, *The Ins and Outs of Homeschooling: The Determinants of Parental Motivations and Student Achievement*, 37 EDUC. & URB. SOC'Y 307, 312 (2005).

8. *See, e.g.*, Cogan, *supra* note 5, at 18-25; Danielle Geary, *Trend and Data Analysis of Homeschooling*, 9 ACAD. LEADERSHIP J., no. 4, 2011; Brian D. Ray & Bruce Eagleson, *State Regulation of Homeschooling and Homeschoolers' SAT Scores*, 6 ACAD. LEADERSHIP J., no. 3, 2008; Ray, *supra* note 1, at 74-106; Brian D. Ray, *Academic Achievement and Demographic Traits of Homeschool Students: A Nationwide Study*, 8 ACAD. LEADERSHIP J., no. 1, 2010; Barwegen et al., *supra* note 5, at 39-58.

9. Bauman, *supra* note 1, at 12; Bonni F. Boschee & Floyd Boschee, *A Profile of Homeschooling in South Dakota*, 5 J. SCH. CHOICE 281, 281-299 (2011); Collom, *supra* note 7, at 307-335; Green & Hoover-Dempsey, *supra* note 5, at 264; STACEY BIELICK, NAT'L CTR FOR EDUC. STAT., ISSUE BRIEF: 1.5 MILLION HOMESCHOOLED STUDENTS IN THE UNITED STATES IN 2007 2-3 (2008), *available at* http://nces.ed.gov/pubs2009/2009030.pdf (describing the substantial increase in the homeschooling rate and population and showing the primary reasons parents opt to homeschool).

10. Jon S. Lerner, *Protecting Home Schooling through the* Casey *Undue Burden Standard*, 62 U. CHI. L. REV. 363, 371 (1995); Timothy B. Waddell, *Bringing It All Back Home: Establishing a Coherent Constitutional Framework for the Re-Regulation of Homeschooling*, 63 VAND. L. REV. 541, 556 (2010); Kimberly A. Yuracko, *Education off the Grid: Constitutional Constraints on Homeschooling*, 96 CALIF. L. REV. 123, 130 (2008).

others to discuss.

Although many of the works on homeschooling tend to consider the preceding three domains discretely, this article crosses boundaries by empirically testing assertions made in a legal review about the motivations inherent in homeschooling and the consequential academic implications.[11] Specifically, a recent law review author opined that many homeschool parents, based on their religious views, provide a substandard education to girls as compared to boys. [12] The author provided no empirical substantiation for the claim, but her assertions can be converted into testable hypotheses for empirical examination, which this article does. Specifically, I examine whether, in a series of educational indicators, there are statistically significant differences between homeschooled boys and girls. I begin with a brief examination of some relevant literature, describe the methods used in this research, and then report the results.

LITERATURE REVIEW

Academic Performance

As mentioned above, the comparably limited body of work on the academic performance of homeschooled students reflects the scant data available for empirical analyses. Homeschooled students are not typically required to submit to systematic assessment, thereby hindering research in this area. The primary sources for the data that do exist have come from SAT and ACT results. Because almost half of homeschooled students attend college[13]—and SAT and ACT scores are ubiquitous for college entrance—these test data have proven to be commonly used metrics in homeschool research. Results from such studies typically show homeschooled students report higher scores than their non-homeschooled peers.

For example Clemente compared the SAT scores of public school, private school, and homeschooled students before their postsecondary studies and found that the average SAT total score of homeschooled students ranked the highest, followed by those who attended private schools, and then those from public schools.[14] Likewise Chatmon compared the SAT scores of public school, private school, and homeschooled students, and found the scores of

11. Yuracko, *supra* note 10, at 132.

12. *Id.*

13. Richard J. Barno, The Selection Process and Performance of Former Home-Schooled Students at Pennsylvania's Four-Year Colleges and Universities (Nov. 2003) (unpublished Ph.D. dissertation, Lehigh University) (on file with Lehigh University Library).

14. Dale Clemente, Academic Achievement and College Aptitude in Homeschooled High School Students Compared to Their Private-Schooled and Public-Schooled Counterparts (June 2006) (unpublished Ph.D. dissertation, Regent University) (on file with the Regent University Library).

homeschooled students to be greater but with no statistically significant difference.[15] In a different type of comparison, Stair, [16] Mason,[17] and Cogan[18] report that the ACT and SAT scores of homeschooled students typically exceed those of the national average.

A second common type of metric used in these analyses is standardized test results, such as the Iowa Test of Basic Skills (ITBS), the California Achievement Test (CAT), or the Stanford Achievement Test. As with college SAT and ACT scores, results from standardized tests typically show homeschooled students perform above the national average.[19] Some of these analyses were completed thirty years ago. For example, Wartes studied the Stanford Achievement scores of thousands of homeschooled students in Washington state. [20] He found that they consistently scored above the national average in all academic areas, with the median score at about the 67th percentile.[21] Similar results were evident in Alaska,[22] Indiana,[23] Massachusetts,[24] Montana,[25] North Dakota,[26] Oklahoma,[27] and

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15. Catherine L. Chatmon, Exploring Gender Disparity in College Aptitude among Christian College Students from Three School Settings (Oct. 2006) (unpublished Ph.D. dissertation, Regent University) (on file with the Regent University Library).

16. Barwegen et al., *supra* note 5, at 12.

17. Gary Mason, *Homeschool Recruiting: Lessons Learned on the Journey*, 184 J. C. ADMISSION 2, 2-3 (2004).

18. Cogan, *supra* note 5, at 19.

19. Ray, *supra* note 8, at 22.

20. Jon Wartes, *Report from the 1986 Home School Testing and Other Descriptive Information about Washington's Home Schoolers: A Summary*, 3 HOME SCH. RESEARCHER, no. 1, 1987; Jon Wartes, *Summary of Two Reports from the Washington Home School Research Project, 1987*, 4 HOME SCH. RESEARCHER, no. 2, 1988; JON WARTES, WASH. HOMESCHOOL RES. PROJECT, REPORT FROM THE 1988 WASHINGTON HOMESCHOOL TESTING (1989); JON WARTES, WASH. HOMESCHOOL RES. PROJECT, THE RELATIONSHIP OF SELECTED INPUT VARIABLES TO ACADEMIC ACHIEVEMENT AMONG WASHINGTON'S HOMESCHOOLERS (1990); JON WARTES, WASH. HOMESCHOOL RES. PROJECT, REPORT FROM THE 1986 THROUGH 1989 WASHINGTON HOMESCHOOL TESTING (1990); JON WARTES, WASH. HOMESCHOOL RES. PROJECT, FIVE YEARS OF HOMESCHOOL TESTING WITHIN WASHINGTON STATE (1991).

21. *See* Wartes, *supra* note 20.

22. ALASKA DEP'T OF EDUC., SUMMARY OF SRA TESTING FOR CENTRALIZE CORRESPONDENCE STUDY (1984); ALASKA DEP'T OF EDUC., SRA SURVEY OF BASIC SKILLS AND ALASKA STATEWIDE ASSESSMENT SPRING OF 1985 (1985); ALASKA DEP'T OF EDUC., RESULTS FROM 1981 CAT (1986).

23. BRIAN D. RAY, HOME EDUCATION IN INDIANA: FAMILY CHARACTERISTICS, REASONS FOR HOMESCHOOLING, AND ACADEMIC ACHIEVEMENT (1997).

24. BRIAN D. RAY, HOME EDUCATION IN MASSACHUSETTS: FAMILY CHARACTERISTICS, ACADEMIC ACHIEVEMENT, AND SOCIAL ACTIVITIES (1998).

25. BRIAN D. RAY, HOME EDUCATION IN MONTANA: FAMILY CHARACTERISTICS AND STUDENT ACHIEVEMENT (1990); BRIAN D. RAY, LEARNING AT HOME IN MONTANA: STUDENT ACHIEVEMENT AND FAMILY CHARACTERISTICS (1995).

26. BRIAN D. RAY, HOME EDUCATION IN NORTH DAKOTA: FAMILY CHARACTERISTICS AND STUDENT ACHIEVEMENT (1991).

27. BRIAN D. RAY, HOME EDUCATION IN OKLAHOMA: FAMILY CHARACTERISTICS, STUDENT

Pennsylvania.[28] Cross-state analyses also show similar results, such as Rudner's study of 20,760 homeschooled students in K–12[29] and Ray's examination of 4,600 homeschoolers.[30]

Non-test score metrics also indicate homeschooled students achieve at superior levels. Cogan studied college grade point averages and found homeschooled students earned a higher first-year GPA (3.41) when compared to students overall (3.12).[31] Similarly, Mason found that homeschooled students had a combined cumulative GPA of 3.47, compared to the 2.91 shared by the general student population.[32] And Jenkins found community college students who had been homeschooled had higher GPAs than their non-homeschooled peers.[33] Additionally, Cogan's comparison of college retention rates showed that homeschooled students more often stayed in school and graduated as compared to the overall population.[34]

Of course, not all studies show homeschooled students outperforming their peers. Delahooke's comparison of private and homeschooled nine-year-olds found no significant differences in achievement.[35] Rakestraw found first- and fourth-grade homeschooled students to be scoring below the national average in mathematics.[36] Stair compared the ACT scores of homeschooled students to non-homeschooled peers with high levels of parental involvement and found no significant difference.[37] Qaqish also examined ACT scores and found little difference, with non-homeschoolers outperforming homeschoolers.[38] Using non-test scores as the metric, Gray discovered little difference in college freshman English scores between those who had been

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ACHIEVEMENT, AND POLICY MATTERS (1992).

28. Howard B. Richman et al., *Academic Achievement and Its Relationship to Selected Variables among Pennsylvania Homeschoolers*, 6 HOME SCH. RESEARCHER, no. 4, 1990.

29. Lawrence M. Rudner, *Scholastic Achievement and Demographic Characteristics of Home School Students in 1998*, Education Policy and Analysis Archives, Mar. 23, 1999.

30. BRIAN D. RAY, A NATIONWIDE STUDY OF HOME EDUCATION: FAMILY CHARACTERISTICS, LEGAL MATTERS, AND STUDENT ACHIEVEMENT (1990).

31. Cogan, *supra* note 5.

32. Mason, *supra* note 17, at 3.

33. Toni P. Jenkins, The Performance of Home Schooled Students in Community Colleges (May 1998) (unpublished Ph.D. dissertation, Texas A&M University) (on file with Texas A&M University).

34. Cogan, *supra* note 5.

35. Mona M. Delahooke, Home Educated Children's Social/Emotional Adjustment and Academic Achievement: A Comparative Study (Feb. 1986) (unpublished Ph.D. dissertation, California School of Professional Psychology, Las Angeles) (on file with California School of Professional Psychology).

36. Jennie F. Rakestraw, An Analysis of Home Schooling for Elementary School-Age Children in Alabama (1987) (unpublished Ph.D. dissertation, University of Alabama) (on file with University of Alabama).

37. Barwegen et al., *supra* note 5.

38. Basil Qaqish, *An Analysis of Homeschooled and Non-Homeschooled Students' Performance on an ACT Mathematics Test*, 17 HOME SCH. RESEARCHER, no. 2, 2007.

homeschooled and those who were not, [39] similar to Barno's finding of no difference in GPAs. [40]

As revealing as these studies are, they should be read with some caution due to limitations associated with them. The first and most important limitation concerns sampling. Because testing is rarely required of homeschooled students, samples are composed of those who agree to testing, which introduces significant selection bias.[41] This particularly affects standardized achievement scores from the K-12 population. For college entrance exam data, the homeschooled population is still composed of those who elect to take the test, but the non-homeschooled population is also, making the comparison more valid. In other words, whether from homeschools or conventional schools, SAT and ACT takers are a self-selected group.[42] The second limitation is that many, if not most, of the early homeschool studies used surveys developed by the researchers, rather than using standardized instruments with established reliability and validity. Moreover, those studies relied heavily on descriptive rather than inferential statistics for their analyses.[43] Later studies, however, did use survey questions drawn from large, national studies—such as the National Assessment of Educational Progress or the National Education Longitudinal Survey—and analyzed results using more sophisticated methods.[44]

Reasons for Homeschooling

In this second domain prominent in the homeschool literature, authors commonly survey homeschool parents about what motivates them to educate their children at home rather than send them to a conventional school. From such studies come lists of the reasons most commonly cited, which often include the opportunity to provide religious instruction, dissatisfaction with public school quality, special needs of the child, or a desire to provide a particular pedagogical environment. As will be discussed below, these motivations, particularly those that are faith-based, sometimes play an

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39. Dovie W. Gray, A Study of the Academic Achievements of Home-Schooled Students Who Have Matriculated into Post-Secondary Institutions (Mar. 1998) (unpublished Ph.D. dissertation, University of Sarasota) (on file with University of Sarasota).

40. Barno, *supra* note 13.

41. Barwegen et al., *supra* note 5; Cheryl Wright, *Home School Research: Critique and Suggestions for the Future*, 21 EDUC. & URBAN SOC'Y 96, 105 (1988).

42. Isenberg, *supra* note 6, at 390.

43. Wright, *supra* note 41, at 100.

44. Collom, *supra* note 7, at 307-08; Susan A. McDowell, Annette R. Sanchez & Susan S. Jones, *Participation and Perception: Looking at Home Schooling through a Multicultural Lens*, 75 PEABODY J. OF EDUC. 124, 134-35 (2000); Ray & Eagleson, *supra* note 8; Ray, *supra* note 1, at 77-78.

important role in criticisms of homeschooling.[45]

In some studies, religious motivations rise to the top of the list as the most important reason to homeschool. Mayberry, for example, surveyed Oregon homeschoolers and found most respondents (65%) were religiously motivated, followed by the special academic needs of their children (22%), and a penchant for a certain type of learning environment (11%).[46] Similarly, the National Center for Education Statistics found that of three primary reasons given for homeschooling, providing religious or moral instruction was most often identified as the primary reason.[47]

In other studies, religious motivation is among the various reasons given by parents, but it is not the primary reason. In Bauman's research, educational quality was the most frequently cited (50%), followed by religion and morality, and other concerns.[48] In fact, Bauman concludes that the results seem to indicate homeschooling is not primarily a religious phenomenon.[49] Boschee and Boschee also found that the major reason given by the parents of homeschoolers in South Dakota was a desire to strengthen family relationships.[50] In Grubb's research a desire to facilitate greater academic levels was the number one reason (religion was number four).[51] And Lange and Liu's sample identified educational philosophy and quality as the primary motivation (religion was number five).[52] Studies by Princiotta and Bielick and Collom report similar findings.[53]

In a different approach some researchers have examined the motivations of homeschool parents through the lens of parental involvement, comparing homeschool parents to public school parents. Green and Hoover-Dempsey's findings suggest parents decide to homeschool for reasons similar to those motivating many public school parents' involvement in their children's education: playing a more active role and helping their child succeed in

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45. Robin L. West, *The Harms of Homeschooling*, 29 PHIL. & PUB. POL'Y Q. 7, 7–8 (2009).

46. Maralee Mayberry, *Characteristics and Attitudes of Families Who Homeschool*, 21 EDUC. & URBAN SOC'Y 32, 35 (1988) [hereinafter *Characteristics*]; Maralee Mayberry, *Home-Based Education in the United States: Demographics, Motivations, and Educational Implications*, 41 EDUC. REV. 171, 173 (1989).

47. BIELICK, *supra* note 9.

48. Bauman, *supra* note 1, at 12-13.

49. *Id.*

50. Boschee & Boschee, *supra* note 9, at 289.

51. DEBORAH GRUBB, HOMESCHOOLING: WHO AND WHY? 13, Paper presented at the Annual Meeting of the Mid-South Educational Research Association (27th, New Orleans, LA, Nov. 3–6, 1998).

52. CHERYL M. LANGE & KRISTIN KLINE LIU, NAT'L CTR. ON EDUC. OUTCOMES, HOMESCHOOLING: PARENTS' REASONS FOR TRANSFER AND THE IMPLICATIONS FOR EDUCATIONAL POLICY 12 (1999).

53. DANIEL PRINCIOTTA & STACEY BIELICK, NAT'L CTR. FOR EDUC. STAT., HOMESCHOOLING IN THE UNITED STATES: 2003 13-14 (2006); Collom, *supra* note 7, at 322-24.

learning.[54] Similarly, Ice and Hoover-Dempsey found that homeschool parents were strongly motivated by an active role construction and a strong sense of efficacy for helping the child learn, rather than beliefs about the values, content, adequacy, and methods of public school education.[55]

Criticisms of Homeschooling

The generally positive findings evident in the homeschool literature do not mean that homeschooling is devoid of criticism. This is particularly, although not exclusively, true in law reviews, where authors advocate for greater regulation of homeschooling. McMullen, for example, expresses concerns about the lack of socialization, poor curricular content, and lack of protection against abuse for children taught at home.[56] Likewise, Waddell argues for the regulation of homeschooling based on the potential for educational neglect or abuse, or the possibility that homeschooled children could be taught in such a way as to render them dangerous or unproductive citizens.[57] When surveyed about homeschooling, school superintendents struck similar notes, believing home-school parents "want to ensure their children's ignorance," or at least do not realize "the serious harm they are doing to their children in the long run, educationally and socially."[58] This may not be entirely surprising, since homeschool parents, according to one superintendent, "have real emotional problems themselves."[59]

West believes unregulated homeschooling invites harms to homeschooled children, the mothers who teach them, and even the communities in which they are raised and taught.[60] West's list of harms include children's knowledge base, literacy, and numeracy; an increased chance for abuse, lack of immunization, too much love from parents, and unquestioning obedience to authority.[61] Economic harms are also inherent, even though homeschool families report greater average incomes than non-homeschool families. Consider this descriptive passage from West:

> The radically fundamentalist "movement" family, however, is considerably poorer than the population, and it is the participants in

54. Green & Hoover-Dempsey, *supra* note 5, at 278.
55. Ice & Hoover-Dempsey, *supra* note 5, at 364.
56. Judith G. McMullen, *Behind Closed Doors: Should States Regulate Homeschooling?* 54 S.C. L. REV. 75, 82-86 (2002).
57. Waddell, *supra* note 10, at 542-47.
58. MARALEE MAYBERRY ET AL., HOME SCHOOLING: PARENTS AS EDUCATORS 92, 94 (1995).
59. *Id.*
60. West, *supra* note 45, at 7.
61. *Id.*

> these movements—the so-called "patriarchy movement" and its "quiverfull" branch and related groups—that are the hardcore of the homeschooling movement. The husbands and wives in these families feel themselves to be under a religious compulsion to have large families, a homebound and submissive wife and mother who is responsible for the schooling of the children, and only one breadwinner. These families are not living in romantic, rural, self-sufficient farmhouses; they are in trailer parks, 1,000- square-foot homes, houses owned by relatives, and some, on tarps in fields or parking lots. Their lack of job skills, passed from one generation to the next, depresses the community's overall economic health and their state's tax base.[62]

As this quote illustrates, the religious beliefs of homeschoolers play a central role in the criticisms of some authors, so West is not alone. Yuracko also grounds her legal analysis on an interpretation of religious, particularly Christian, teaching.[63] Rather than the broad (empirically unsubstantiated) reproach of unregulated homeschooling by West, [64] Yuracko takes a more focused (empirically unsubstantiated) approach, paying particular attention to the treatment, or mistreatment, of girls vis-à-vis boys in homeschooling.[65]

Citing the Equal Protection Clause, Yuracko opines that there are "limits on the degree of sexist homeschooling that states may permit," and that there is reason to believe Christian homeschoolers, which make up a non-trivial percentage of the homeschool community, practice sexism in the education they provide girls as compared to boys.[66] Specifically, reflecting the religious beliefs of parents, Yuracko claims girls are intentionally provided a substandard or inferior education.[67] Yuracko supports the claim by pointing to Christian homeschooling material—curricula, books, and websites—that reveal "an ideology of female subservience and rigid gender role differentiation."[68] Like Waddell,[69] West,[70] and others,[71] Yuracko argues for state regulation of homeschooling to protect the interests of students, specifically girls, harmed by the beliefs and practices of their parents. She

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62. *Id.* at 10.
63. Yuracko, *supra* note 10.
64. West, *supra* note 45.
65. Yuracko, *supra* note 10, at 123.
66. *Id.*
67. *Id.* at 156.
68. *Id.*
69. Waddell, *supra* note 10.
70. West, *supra* note 45, at 132.
71. Khianna Bartholomew, *Avoiding Implicit Acceptance of Bigotry: An Argument for Standardized Testing of Home-Schooled Children*, 92 CORNELL L. REV. 1177 (2007).

notes, "[S]tates must check rampant forms of sexism in homeschooling so as to prevent the severe under-education of girls by homeschooling parents who believe in female subordination."[72]

Noticeably missing from Yuracko's article is any empirical substantiation. While she reviews some homeschool material as evidence for her assertion of "an ideology of female subservience and rigid gender role differentiation,"[73] she provides no indication of how widely used such materials are and to what degree of fidelity they are used. To the extent that some parents believe in "female subordination" (itself an unsupported claim), are these beliefs actually manifest in the education they provide their children? If so, how and to what extent? Are girls, in fact, so under-educated that state action is required? Yuracko brushes aside such questions by claiming, "[u]nder existing laws, it is impossible to know how often and to what extent such beliefs lead to significantly inferior substantive educations for homeschooled girls."[74]

Yet, if Yuracko's assumptions are correct, it *should* be possible to detect if female homeschooled students are receiving an inferior education. If female homeschooled students are systematically receiving an inferior education to the extent that state intervention is required, researchers should be able to detect a difference in educational outcomes between boys and girls. Yuracko's claims can, in fact, be turned into testable research questions. Although no one has tested her specific claims in a systematic way, a few studies have included gender in their analyses, thereby producing some findings on differences between genders. However, the results have been less than conclusive. In Collom's findings, gender was not statistically associated with student achievement,[75] but in a study by Ray it was.[76] He found that girls scored somewhat higher in language than boys, but boys scored somewhat higher in math than girls.[77] Ray later found a slight but statistically significant difference based on gender when girls actually outperformed boys.[78]

Of course, three studies do not create a general consensus, particularly where their findings differ. Moreover, the difference between boys and girls was not the central focus of any of the three studies. Thus, the results reported below test Yuracko's claims by examining differences between homeschooled boys and girls on a series of educational indicators. It also analyzes differences in *perceptions* of student performance based on gender,

72. Yuracko, *supra* note 10, at 132.
73. *Id.* at 156.
74. *Id.*
75. Collom, *supra* note 7.
76. Ray, *supra* note 1.
77. *Id.*
78. Ray, *Academic Achievement*, *supra* note 8.

an analysis facilitated by a series of questions included in the national dataset used as the sample source for this study.

METHODS

The results reported below examine these differences by asking a series of research questions:

1. Is there a significant difference between male and female homeschooled students in educational indicators?
2. Is there a significant difference in comparative perceptions of male and female student performance in math between homeschool and non-homeschool parents and between parents of male students and parents of female students?
3. Is there a significant difference in comparative perceptions of male and female student performance in math between homeschooled and non-homeschooled students and between male and female ninth grade students?

Sample

The sample for this study came from participants in the High School Longitudinal Study of 2009 ("HSLS:09").[79] HSLS:09 is a nationally representative longitudinal study of more than 21,000 ninth graders in 944 schools who will be followed throughout their secondary and postsecondary years.[80] One of the questions in the study asks students to identify where they attended school last year, and one of the response options is "homeschooled."[81] This question yielded a total homeschool subsample of 190 students, which is a weighted sample size of 36,255 in the analyses.[82] Although 190 is small compared to the study's overall sample size, it is similar or larger in size than other studies of homeschooled students.[83] By definition, the homeschool subsample is also limited only to those who, at the time of data collection, were attending a conventional school. This introduces its own type of selection bias, not those who selected to be tested, but those who selected to stop homeschooling and attend a conventional

79. Steven J. Ingels et al., High School Longitudinal Study of 2009 (HSLS:09) Base-Year Field Test Report, (National Center for Education Statistics, Working Paper No. 201001), *available at* http://nces.ed.gov/surveys/hsls09/pdf/2009q_student.pdf.

80. *Id.*

81. *Id.*

82. *Id.*

83. STACEY BIELICK, KATHRYN CHANDLER & STEPHEN P. BROUGHMAN, NAT'L CTR. FOR EDUC. STAT., HOMESCHOOLING IN THE UNITED STATES: 1999, 22 (2001); Collom, *supra* note 7; Green & Hoover-Dempsey, *supra* note 5; Isenberg, *supra* note 6; McDowell, Sanchez & Jones, *supra* note 44.

school in the ninth grade.

Table 1 includes descriptive statistics for the sample disaggregated by homeschool and non-homeschool and by gender.[84] Note that the homeschooled students included in the study were attending a conventional school at the time of data collection and had been homeschooled for some period of time prior to the ninth grade.[85] Although the data does not indicate how long they were homeschooled before attending a conventional school, other research suggests they likely were homeschooled for most or all of their academic life prior to the ninth grade.[86]

As indicated in Table 1, males and females within the homeschool verses non-homeschool subsamples were similar on many characteristics (mean values for individualized education plan, school type, and parent composition can be read as percentages).[87] One notable difference includes an individualized education plan ("IEP"), which measures whether someone receives special education services.[88] On this measure, males tend more often than females to have an IEP.[89] When comparing homeschooled to non-homeschooled students, a comparably greater percentage of homeschooled students were white, and a comparably greater percentage of non-homeschooled students were black.[90]

84. *See infra* Table 1.
85. Ingels et al., *supra* note 79.
86. Ray, *Academic Achievements*, *supra* note 8.
87. *See infra* Table 1.
88. *Id.*
89. *Id.*
90. *Id.*

Table 1 (Descriptive Statistics, Entire Sample)

	Mean				Standard Error			
	Non-Homeschool		Homeschool		Non-Homeschool		Homeschool	
	Male	Female	Male	Female	Male	Female	Male	Female
Socio-economic status	0.05	0.06	0.11	0.08	0.01	0.01	0.07	0.09
Individualized education plan	0.25	0.15	0.22	0.13	0.01	0.01	0.06	0.06
School type	0.18	0.19	0.18	0.23	0.00	0.00	0.04	0.05
School climate	-0.39	-0.35	-0.53	-0.38	0.01	0.01	0.11	0.13
Parent composition	0.78	0.77	0.85	0.85	0.00	0.00	0.04	0.05
	Percentage				Frequency			
Race/Ethnicity								
Other	18.01	17.96	24.55	16.25	1931.00	1875.00	27.00	13.00
Black	10.62	10.18	2.73	2.50	1139.00	1063.00	3.00	2.00
Hispanic	16.28	16.59	10.91	15.00	1745.00	1732.00	12.00	12.00
White	55.09	55.26	61.82	66.25	5906.00	5768.00	68.00	53.00
School locality								
City	28.20	28.41	30.00	30.00	3023.00	2965.00	33.00	24.00
Suburb	35.37	35.90	38.18	31.25	3792.00	3747.00	42.00	25.00
Town	12.03	12.05	11.82	12.50	1290.00	1258.00	13.00	10.00
Rural	24.40	23.64	20.00	26.25	2616.00	2468.00	22.00	21.00

Dataset and Variables

The HSLS:09 study focuses on understanding students' trajectories from the beginning of high school into postsecondary education, the workforce, and beyond.[91] What students decide to pursue when, why, and how are crucial

91. Ingels et al., *supra* note 79.

questions, with a particular focus on science, technology, engineering, and math. HSLS:09 is a longitudinal study implemented by the National Center for Education Studies (NCES). Like past NCES studies, HSLS:09 includes surveys of students, their parents, math and science teachers, and school administrators.[92] It also includes assessments of student academic performance.[93] New to this study, compared to prior iterations, are assessments of algebraic skills, reasoning, and problem solving, and a new survey of school counselors.[94] The first wave of data collection for HSLS:09 began fall 2009 and the second wave began January 2012.[95]

The advantage of using this dataset is that the data is nationally representative, and the subsample of homeschooled students is sufficiently large for analyses. In some respects it is similar to other national datasets used in homeschool research, such as National Household Education Survey or the Current Population Survey, but its advantages come from its thousands of variables measuring numerous cognitive, behavioral, and psycho-social constructs for students, parents, and schools.[96]

Eleven dependent or outcome variables were selected from HSLS:09 to answer the research questions above. The decision to use a large index of variables was based on a desire to give Yuracko's claims the full benefit of the doubt. Were the study to use only one outcome variable, it is possible that a real effect might go undetected because that one variable, a test score, for example, failed to capture a difference where one actually existed.. Table 2 lists the variables and how they were coded for the analyses.[97] While most of these are self-evident, a few may require some explanation. Three variables are measured in z-scores, which is a form of standard score with a mean of zero and a standard deviation of one. "Math identity" measures whether respondents think of themselves as "math people." "Math self-efficacy" measures how confident respondents are in math.[98] If Yuracko's assertions about substandard education for females are correct, we would expect to see females with significantly lower scores in math performance, identity, interest, and self-efficacy.

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92. *HSLS:09 Questionnaires*, NAT'L CENT. EDUC. STATISTICS, http://nces.ed.gov/surveys/hsls09/questionnaires.asp (last visited Nov. 11, 2013) [hereinafter *Questionnaires*].

93. *Id.*

94. Ingels et al., *supra* note 79.

95. *HSLS:09, Overview*, NAT'L CENT. EDUC. STATISTICS, http://nces.ed.gov/surveys/hsls09/index.asp (last visited Nov. 11, 2013).

96. Collom, *supra* note 7; Isenberg, *supra* note 6, at 387-409.

97. *See infra* Table 2.

98. *See generally* Albert Bandura, *Self-Efficacy Mechanism in Human Agency*, 37 AM. PSYCHOLOGIST 122 (1982); Albert Bandura, Exercise of Personal and Collective Efficacy in Changing Societies, *in* SELF-EFFICACY IN CHANGING SOCIETIES 1 (Albert Bandura ed., 1995); ALBERT BANDURA, SELF-EFFICACY: THE EXERCISE OF CONTROL (1997).

Likewise, we would also expect to see girls and the parents of girls reporting lower educational expectations compared to boys. On math-taking, both at the time of measurement and for the future, we should expect to see parents more often encouraging boys to take math as compared to girls. Similarly, boys should report that they talked with their parents about attending college more often than girls.

The final two dependent variables measure the *perception* of math performance between girls and boys. It asks students and parents to identify who they think do better in math—girls or boys.[99] On the ordinal scale, low numbers indicate girls perform much better in math, while high numbers indicate boys perform much better.[100] If Yuracko's claims are correct, we would expect to see high numbers on these scales, particularly among homeschool parents.

Math was used as the primary construct for two reasons. The first was a practical one—the dataset includes measures only on math and science.[101] But math, rather than science, also proved useful given the aforementioned finding that homeschooled boys appear to perform better in math than homeschooled girls.[102] This suggests that using math as the primary construct makes the research more conservative. Not only should we expect the results to favor boys due to Yuracko's claims of discrimination, but prior empirical findings also suggest likewise.[103] If the study finds no difference, or an advantage for girls, such findings would be that much more significant.

Table 2 also includes the independent and control variables used in the analyses.[104] The primary independent variable in all research questions is gender.[105] Homeschool verses non-homeschool is also an independent variable.[106] The other variables are used as control variables, given evidence from prior studies that they may confound the relationship between the independent and dependent variables in the study.[107] Most of these are also self-evident, except for school climate. This variable comes from a series of questions that asked school administrators to rate their schools on a series of climate indicators, such as racial conflict between students, crime and violence, misbehavior and disrespect, student conflict (other than racial), and

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99. HSLS:09 Parent Survey, NATIONAL CENTER FOR EDUCATION STATISTICS, (2009), http://nces.ed.gov/surveys/hsls090852/pdf/2009q_parent.pdf.

100. *Id.*

101. *Questionnaires*, *supra* note 92.

102. Ray, *supra* note 1.

103. *Questionnaires*, *supra* note 92.

104. *See infra* Table 2.

105. *Id.*

106. *Id.*

107. *See, e.g.*, Bauman, *supra* note 1; Cogan, *supra* note 5; Collom, *supra* note 7; Ray, *supra* note 1; Wright, *supra* note 41.

gang activity.[108] This is measured as a z-score, where a higher value indicates a more positive climate.

Table 2 (Variables Used in Analyses)

Variable	Coding
Dependent Variables	
Math performance	Continuous, 0-100
Math identity	Continuous, z-scores
Math self-efficacy	Continuous, z-scores
Math interest	Continuous, z-scores
Student educational expectation	Ordinal, 1 (less than HS) to 10 (PhD, MD, JD)
Parent educational expectation	Ordinal, 1 (less than HS) to 10 (PhD, MD, JD)
Student taking math because parent encouraged it	1=yes, 0=no
Student take math in the future because parent encouraged it	1=yes, 0=no
Talk with parent about college	1=yes, 0=no
How student compares males and females in math	Ordinal, 1 (females much better) to 5 (males much better)
How parent compares males and females in math	Ordinal, 1 (females much better) to 5 (males much better)
Independent Variables	
Gender	1=female, 0=male
Socio-economic status	Continuous, z-scores
School type	0=public, 1=private
School climate	Continuous, z-scores
Number of parents at home	0=two parents, 1=not two parents
Race/Ethnicity (for homeschool only sample)	1=white, 0=minority
Race/Ethnicity (for entire sample)	Black, Hispanic, White, Other, dummy coded
Urbanicity	City, suburban, town, rural, dummy coded

108. *Administrator Survey*, NATIONAL CENTER FOR EDUCATION STATISTICS, (2009), http://nces.ed.gov/surveys/hsls09/pdf/2009q_admin.pdf.

IEP status	0=no, 1=yes
Homeschooled (for entire sample)	0=no, 1=yes

Analysis

The research questions in this study were analyzed using multiple regression. Because of the complex sampling design used in data collection, all analyses were completed using Balanced Repeated Replication ("BRR") procedures.[109] It is outside the scope of this treatment to provide a detailed explanation of this process; in brief, BRR is used to estimate the variability of a statistic taking into account complex sampling procedures. A complex sampling design is one in which participants end up in the sample not through simple random sampling—where everyone has an equal and independent chance to be included—but as a result of an unequal selection probability (i.e., some groups are oversampled) and clustered sampling procedures, where groups of individuals (students within schools) are selected for the sample.[110] Such sampling designs result in undesirable variance properties (manifest in the standard errors) which can be corrected through BRR, an iterative procedure that provides an unbiased estimate of variances.[111] For this treatment, the AM software was used for regression using BRR, a program designed specifically for analyzing NCES's complex datasets.[112]

For Question 1, nine regressions were run, one for each of the dependent variables listed below. The sample for these analyses was only homeschooled students. Each took the form, $Y = \beta_0 + \beta_1(\text{gender}) + \beta_2(\text{socio-economic status ("SES")}) + \beta_3(\text{school type}) + \beta_4(\text{school climate}) + \beta_5(\text{number parents at home}) + \beta_6(\text{race}) + \beta_7(\text{suburban}) + \beta_8(\text{town}) + \beta_9(\text{rural})$, where β_0 equals intercept, or the predicted outcome when all other variables in the equation are zero, β_1 through β_9 equals effects of the independent and control variables on the respective outcome variables, and Y = (a) math performance, (b) math identity, (c) math self-efficacy, (d) math interest, (e) student educational expectation, (f) parent educational expectation, (g) student taking math because parents encouraged it, (h) student will take more math because

109. INGELS ET AL., HIGH SCHOOL LONGITUDINAL STUDY OF 2009 (HSLS:09) BASE YEAR DATA FILE DOCUMENTATION (National Center for Educational Statistics 2011), *available at* http://nces.ed.gov/surveys/hsls09/pdf/2011328_1.pdf.

110. Debbie L. Hahs-Vaughn, *Analysis of Data from Complex Samples*, 29 INT'L J. OF RES. & METHOD IN EDUC. 165 (2006).

111. *HSLS:09 Data and Documentation*, NAT'L CENT. EDUC. STATISTICS, http://nces.ed.gov/surveys/hsls09/hsls09_data.asp (last visited Nov. 14, 2013).

112. *See* Jon Cohen, *AM Statistical Software*, AMERICAN INSTS. FOR RESEARCH, http://am.air.org/default.asp (last visited Nov. 14, 2013).

parents encourage it, or (i) student talked with parent about college.[113]

For Question 2, two OLS regressions were run, one for each of the dependent variables listed below. Each took the form, $Y = \beta_0 + \beta_1(\text{gender}) + \beta_2(\text{SES}) + \beta_3(\text{school type}) + \beta_4(\text{school climate}) + \beta_5(\text{number parents at home}) + \beta_6(\text{homeschool}) + \beta_7(\text{suburban}) + \beta_8(\text{town}) + \beta_9(\text{rural}) + \beta_{10}(\text{individualized education program ("IEP")}) + \beta_{11}(\text{gender x homeschool}) + \beta_{12}(\text{other race}) + \beta_{13}(\text{black}) + \beta_{14}(\text{hispanic})$, whereY equals how students compare males and females in math, how parents compare males and females in math. Betas were as defined in Question 1.

The analyses in Question 2, unlike those for Question 1, used homeschooled and non-homeschooled students. It did so because not only are differences between parents and students within the homeschool sample important, so too are differences between those in and outside of the homeschool community. If Yuracko's assertions are correct, we would expect to see homeschool parents and students reporting higher scores on the perceptions variables, meaning they perceive that boys perform better in math. This is in addition to measuring whether boys who were homeschooled, and their parents, perceive that boys do better in math. To facilitate these examinations, the equations include a variable that measures whether the student was homeschooled and also an interaction term between homeschool and gender.[114] The latter measures the combined effect of homeschool status and gender, in addition to the effects of each characteristic separately. The larger sample comes with the benefit of being able to add an additional variable—IEP status in this case—and to measure race or ethnicity in greater detail by categorizing it into four groups (Black, Hispanic, White, Other) rather than two (Minority/White).[115]

RESULTS

The results are organized by research question. Under each research question, descriptive statistics are presented first, followed by regression results.

Question 1

Table 3 includes the descriptive statistics for all nine of the dependent variables for this question.[116] As indicated in Table 3, there is no clear trend;

113. Note that for dependent variables (a) through (f), OLS regression was used. For dependent variables (g) through (i), logistic regression was used, given the dichotomous scales of measurement.

114. *See supra* Question 2.

115. *See supra* Table 2.

116. *See infra* Table 3.

scores for girls are greater than those for boys on some measures but less on others. In math performance, girls outscore boys by a little more than two points. Likewise, girls report greater math self-efficacy and higher educational expectations than boys. A greater percentage of girls were taking math at the time of data collection because their parents encouraged it, and a greater percentage expected to take more math in the future due to parental encouragement. Similarly, a greater percentage of girls talked with their parents about going to college. The variables on which boys scored greater than girls were on math identity and math interest. And the parents of boys held higher educational expectations compared to those of girls.

Table 3 (Descriptive Statistics for Question 1 Dependent Variables)

Variable	Mean		SD	
	Male	Female	Male	Female
Math performance	40.44	42.56	11.98	11.25
Math identity	0.03	-0.22	0.91	0.91
Math self-efficacy	-0.06	0.25	1.11	1.13
Math interest	0.22	-0.02	1.12	1.19
Student educational expectation	5.93	6.61	2.66	2.67
Parent educational expectation	6.93	6.53	2.93	2.47
	% yes			
Student taking math because parent encouraged it	0.15	0.2		
Student will take more math because parents want him/her to	0.25	0.34		
Student talked with parents about college	0.78	0.85		

As results in Table 4 indicate, none of the mean differences evident in Table 3 for math performance, math identity, math self-efficacy, math interest, and educational expectations were statistically significant.[117] That is, there were no significant differences between males and females—or their parents—on any of the dependent measures. In fact, almost none of the

117. *See infra* Table 4.

independent and control variables proved to be significant predictors of any of the dependent variables. Socio-economic status was the only variable that was significant, indicating a positive relationship between SES and math performance, as well as SES and educational expectations.

Table 4 (Question 1 OLS Regression Results)

	Math Performance	Math Identity	Math Self-Efficacy
Parameter	coeff. (se)	coeff. (se)	coeff. (se)
Intercept	33.61 (8.33)*	-0.84 (.66)	-0.21 (.74)
SES	5.58 (2.01)*	0.04 (.14)	0.31 (.23)
School type	3.69 (4.68)	0.65 (.55)	-0.28 (.48)
School climate	2.36 (2.28)	-0.04 (.15)	0.14 (.16)
Parent composition	-3.12 (4.68)	0.13 (.27)	0.50 (.50)
Gender	1.13 (3.50)	-0.42 (.29)	0.17 (.32)
Race	6.12 (3.50)	0.16 (.26)	0.35 (.37)
Suburb	-1.36 (3.83)	-0.08 (.31)	0.12 (.36)
Town	-0.69 (5.26)	0.25 (.40)	-0.37 (.47)
Rural	-3.57 (3.92)	-0.48 (.31)	-0.34 (.40)
	F=3.43*, R^2=.38	F=1.21, R^2=.25	F=1.09, R^2=.30
	Math Interest	Student Educational Expectation	Parent Educational Expectation
Parameter	coeff. (se)	coeff. (se)	coeff. (se)
Intercept	-0.51 (.90)	7.03 (2.95)*	6.37 (3.26)
SES	-0.19 (.22)	1.81 (.63)*	1.35 (.66)*
School type	0.08 (.59)	-1.16 (1.83)	0.73 (1.21)
School climate	0.23 (.19)	0.04 (.63)	-0.28 (.51)
Parent composition	0.63 (.66)	-0.45 (1.78)	-0.36 (2.70)
Gender	-0.09 (.34)	0.79 (.88)	-0.54 (.95)
Race	0.67 (.35)	-0.73 (.87)	-0.50 (1.32)
Suburb	-0.04 (.32)	0.63 (1.18)	-0.78 (1.38)
Town	0.07 (.54)	0.03 (1.78)	0.48 (1.30)

Rural	-1.14 (.41)*	0.55 (1.83)	-0.40 (1.27)
	F=2.05*, R^2=.37	F=2.07*, R^2=.43	F=1.18*, R^2=.35

*p<.05

As with the OLS regression results, the logistic results in Table 5 indicate that the differences between genders in math taking and talking about college with parents were not statistically significant.[118] Moreover, none of the covariates were significant predictors of the three dependent variables in Table 5.

Table 5 (Question 1 Logistic Regression Results)

Parameter Name	Taking Math Because Parents Encouraged coeff. (se)	Plans to Take More Math Because Parents Encourage coeff. (se)	Talk with Parents about College coeff. (se)
Intercept	-5.725 (68.20)	-3.091 (9.62)	4.195 (14.01)
SES	1.09 (12.85)	-0.405 (.87)	1.987 (3.12)
School type	0.554 (18.14)	0.008 (3.39)	-0.37 (10.33)
School climate	-0.422 (7.35)	0.091 (.72)	-0.047 (1.64)
Parent composition	1.723 (13.33)	2.073 (8.90)	-2.394 (9.90)
Gender	0.498 (6.65)	0.71 (1.28)	0.742 (5.64)
Race	1.126 (20.43)	0.551 (1.48)	-0.424 (4.81)
Suburb	1.108 (16.45)	0.171 (1.12)	0.325 (5.69)
Town	0.808 (14.99)	-0.402 (5.02)	0.417 (9.99)
Rural	-0.686 (5.86)	-1.689 (2.33)	-0.143 (7.76)

Questions 2 and 3

As a reminder, Questions 2 and 3 measure differences in students' and parents' perceptions of males' and females' comparative performance in math. Table 6 includes the descriptive statistics for the two dependent measures disaggregated by homeschool status and gender.[119] Higher scores

118. *See infra* Table 5.
119. *See infra* Table 6.

indicate participants believe males perform better in math. A value of three signifies a perception that males and females perform about the same in math.

Beginning with parents' perceptions, the means for homeschool and non-homeschool parents both are close to three, but the homeschool mean is slightly greater (homeschool equals 3.3, non-homeschool equals 3.2), meaning homeschool parents perceive males perform better than females in math.[120] Likewise, the parents of males report slightly greater means than the parents of females. Turning to students' perceptions, the trends in means are the same as for parents, with the perception means at or very close to three; meaning males and females are perceived to perform about the same in math.[121]

Table 6 (Questions 2 and 3 Descriptive Statistics)

	Homeschooled Mean (sd)	Not Homeschooled Mean (sd)	Males Mean (sd)	Females Mean (sd)
How parent compares males and females in math	3.3 (.96)	3.2 (.84)	3.3 (.83)	3.1 (.84)
How student compares males and females in math	3.0 (.86)	2.9 (.84)	3.0 (.96)	2.9 (.83)

Although the mean differences are small, they are statistically significant for one of the independent variables. Specifically, the differences between males and females and between the parents of males and females are significant, where males and the parents of males believe males perform better in math.[122] The difference based on homeschool status was not significant.

120. *Id.*
121. *Id.*
122. *Id.*

Table 7 (Questions 2 and 3 Regression Results)

	Students Compare Males and Females in Math	Parents Compare Males and Females in Math
Parameter Name	coeff. (se)	coeff. (se)
Intercept	2.982 (.12)	3.408 (.13)*
SES	0.049 (.03)*	0.109 (.03)*
IEP status	-0.147 (.05)*	-0.066 (.05)
School type	0.092 (.09)	-0.04 (.07)
School climate	-0.027 (.02)	0.018 (.02)
Parent composition	0.019 (.05)	-0.044 (.06)
Homeschool	0.119 (.29)	-0.074 (.23)
Gender	-0.117 (.04)*	-0.18 (.05)*
Gender x homeschool	-0.072 (.32)	0.542 (.27)*
Other Race	-0.049 (.06)	0.054 (.08)
Black	-0.098 (.10)	-0.011 (.08)
Hispanic	-0.002 (.05)	-0.203 (.07)*
Suburb	-0.011 (.05)	0.027 (.05)
Town	-0.08 (.07)	-0.04 (.07)
Rural	-0.103 (.07)	-0.059 (.05)
	F=4.12*, R^2=.02	F=4.88*, R^2=.05

*p<.05

The other term of interest in these analyses is the interaction between gender and homeschool status. As a reminder, the interaction term measures the combined effect of gender and homeschool status. As indicated in Table 7, the combined effect of these two variables is not significant for students, but it is for parents.[123] The interpretation of the coefficient is not intuitive, but Table 8 illustrates the effect of the interaction.[124] The non-homeschool parents of males show a greater mean than those of females, and the mean of parents of non-homeschooled males is greater than the mean of homeschool parents of males. Based on these patterns, we would expect to see the mean

123. *See supra* Table 7.
124. *See infra* Table 8.

of homeschool parents of females to be the lowest of all—lower than those of homeschool parents of males and lower than non-homeschool parents of females. Instead, the mean of homeschool parents of females is the greatest of all groups, meaning the parents of homeschooled females more so than all other groups believe males perform better in math than females.

Table 8 (Means of Gender and Homeschool Interaction)

	Non-homeschool	Homeschool
Male	3.4	3.3
Female	3.2	3.7

DISCUSSION

This study examined differences in a series of educational indicators among homeschooled students and parents based on gender and perceptions of student performance in math among homeschooled and non-homeschooled students and parents based on gender and homeschool status. The basis for this study was claims made by Yuracko that religious parents of homeschoolers—which constitute the majority of the homeschool community[125]—provide substandard levels of education for their daughters, a violation of the Equal Protection Clause. [126] Yuracko saw this as a reason for increased regulation of homeschooling to ensure such discrimination is ameliorated.[127] Missing from her assertions was any empirical substantiation of substandard education provided to homeschooled girls. Therefore, this study put Yuracko's claims to the test. Regression results indicate no significant differences in educational indicators based on gender.[128] However, there were significant differences in perceptions of student performance in math based on gender and also the combined effect of gender and homeschool status. Males and the parents of males believe males perform better in math, and the parents of homeschooled females appear to believe males perform better in math.[129]

In general, the results presented above call into question Yuracko's claims. If homeschool parents systematically provide a substandard education to their daughters, we would expect to detect the effects of such discrimination in at least one of the outcomes used in the study. Yet, whether

125. *Characteristics*, *supra* note 46. *See generally* BRIAN D. RAY, STRENGTH OF THEIR OWN: HOME SCHOOLERS ACROSS AMERICA (1997).

126. Yuracko, *supra* note 10.

127. *Id.*

128. *See infra* Table 9.

129. *See supra* Tables 6, 7, 8.

it was math performance, self-efficacy, interest, expectations, or almost any of the other variables measured, this was not the case. The purported discrimination against daughters in homeschooling was not manifest in performance and psycho-social variables.[130]

There are at least two possible reasons for this outcome. First, because of selection bias the sample fails to capture a critical mass of the types of parents who fit Yuracko's description. That is, parents who discriminate against their daughters are not likely to be the types who send their children to a conventional school after years of comparative neglect. This assumes, of course, that such parents see their presumed actions as "neglect" in the same way as Yuracko—that they believe they have something to hide. It also assumes such parents believe they would face some punitive action if their "neglect" were discovered, thus compelling them to avoid sending their child to a conventional school, either public or private, since both types were represented in the data. But neither of these assumptions proves reasonable or realistic, which means to the extent that some form of selection bias is present in these data, they would likely not produce the systematic effects presented above.

Second, Yuracko is incorrect in her assertions of discrimination. Most homeschool families may be religious, but this does not necessarily mean their faith-based views of the relationships between men and women motivate their educational decisions.[131] Indeed, Green and Hoover-Dempsey note that pedagogical reasons have become some of the leading motivators for homeschooling.[132] Isenberg also notes that a plurality of homeschoolers are motivated by educational reasons, where religious reasons appear to be the primary motivation for only a minority of homeschool parents.[133] And even for those who cite religious reasons for homeschooling, there is no evidence in educational practice or educational outcomes that the quality or content of education is negatively affected by parents' religious views.

Of course, just because alleged discrimination is not manifest in the types of outcomes measured here does not mean parents do not hold discriminatory views. The significant interaction effect described above seems to indicate homeschool parents hold views about males and females that are manifest in their perceptions of student math aptitude.[134] On this one measure, then, it seems Yuracko might be correct. Yet, a follow-up analysis suggests another perspective on the interaction findings. Note that one of the dependent variables above was math interest and that girls reported less interest in math

130. *See supra* Tables 3, 4, 5.
131. Mayberry, *supra* note 46. *See generally* RAY, *supra* note 125.
132. Green & Hoover-Dempsey, *supra* note 5.
133. Isenberg, *supra* note 6.
134. *See supra* Table 8.

compared to boys (although the difference was not significant).[135] Perhaps parents' perceptions of the comparative performance of boys and girls in math is not so much a function of gender (or faith-based gender roles) as it is the parents' observation of their child's interest. If a parent observes that a child has comparably low interest in some task, the parent may conclude that the child will not perform comparably as well in the task as someone with greater interest. Applied here, if girls demonstrate systematically less interest in math, parents of girls may conclude that boys will perform better than girls. To test this hypothesis, I re-ran the regression analysis of parental perceptions of the performance of boys and girls in math and included interest in math as a control variable. As the results in Table 9 indicate, the inclusion of math interest makes the interaction effect non-significant.[136]

Table 9 (Regression Results for Parental Perceptions of Math Performance between Girls and Boys, Controlling for Student Math Interest)

Parameter Name	coeff. (*se*)
Intercept	3.467 (.13)*
SES	0.102 (.03)*
Math interest	0.008 (.02)
IEP status	-0.073 (.05)
School type	-0.094 (.07)
School climate	0.031 (.02)
Parent composition	-0.019 (.07)
Homeschool	-0.08 (.30)
Gender	-0.164 (.05)*
Gender x homeschool	0.528 (.31)
Other race	0.057 (.09)
Black	0.031 (.12)
Hispanic	-0.213 (.08)*
Suburb	0.004 (.05)
Town	-0.049 (.07)
Rural	-0.081 (.05)
	F=3.90*, R^2=.06

*p<.05

135. *See supra* Table 3.
136. *See infra* Table 9.

What remains, then, is a significant difference in perceptions of math performance based on gender—a difference that is entirely logical. Recall that the variable here is scaled so that a higher number means boys are perceived to be better in math and a lower number means girls are perceived to be better in math (not that a number less than three—the mid-point—means girls are *worse* in math). So the negative coefficient on the gender term means parents of girls have a lower score on this variable compared to parents of boys; in other words, parents of girls think that girls do better in math, just like they probably think girls do better on a host of other tasks.

CONCLUSION

Yuracko would have readers of her article believe homeschooled girls receive a substandard education compared to homeschooled boys, and that consequently increased regulation of homeschooling is required.[137] However, empirical evidence presented here indicates there is no reason to believe the former, casting significant doubt on the need for the latter—at least for the reasons she posits.[138] If she or others advance different reasons to impose regulations on the homeschool community, it seems reasonable to expect the asserted need for those regulations to be more than unsupported claims. Indeed, the right and freedom of parents to direct the upbringing of their children—including their education—should not be burdened by regulation based on mere assertion of systematic harm. Instead, those who agitate for increased regulation should bear the burden of proving the need for such regulation.

137. Yuracko, *supra* note 10.
138. *Id.*